# SHOWMask 0.0: Using diurnal cycle and microwave surface emissivity for warm scene calibration

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*by*

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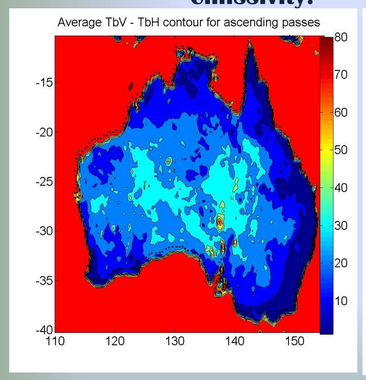
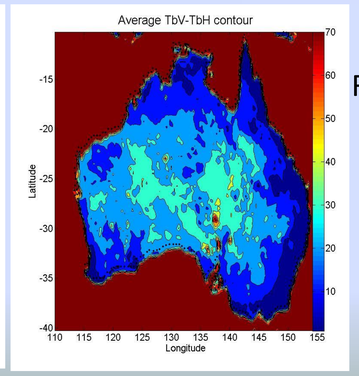
## SHOWMask 0.0

- This is a preliminary version of SHOWMask.
- Developing tools on continental Australia.
- Using 2015 GMI V5 data gridded to 0.25 Degree latitude-longitude grid.
- Data accumulated in daily average

- **Diurnal Variation**
  - ✓ Over arid regions, we expect to have high diurnal variation.
  - ✓ Further, over regions where ascending and descending passes cross each other the asc. – desc. Brightness temperature is estimate. Figure 2 gives an example of the domain.
  - ✓ 10 and 18 GHz channels used
  - ✓ Figures 3-7 show the results and prelim mask
  - ✓ Figure 8 is a map of land cover type over Australia.

- **Surface Emissivity**
  - ✓ First simulated microwave surface emissivity for 10 GHz V and H Pol. over pure water and over sandy and mostly clay bare soil.
  - ✓ For pure water Meissner- Wentz emissivity model is used.
  - ✓ For land emissivity a generalized mixing model by Mironov et al, 2013 is used (figure 9).
  - ✓ The Second Stoke's parameter, Tv – Th is estimated from GMI 10 GHz Observation, The results agree with the simulated emissivity.




## What is SHOWMask ? HOmogeneous Warm Scene Mask

**A Binary Mask.**

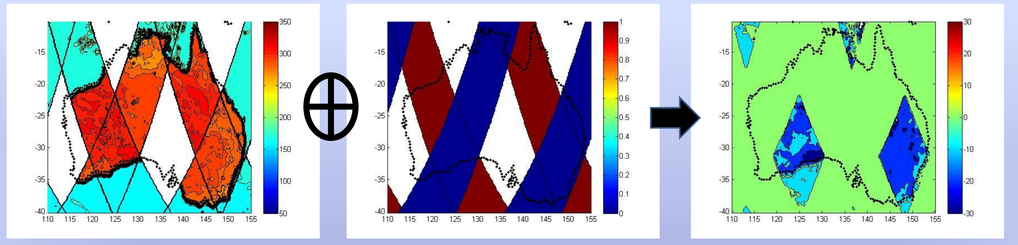


Figure 2: Domain

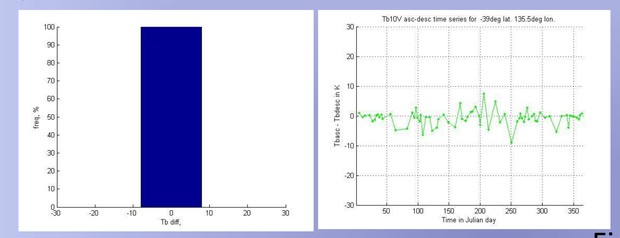



Figure 3: Diurnal Variation over water




Figure 4: Diurnal Variation over water

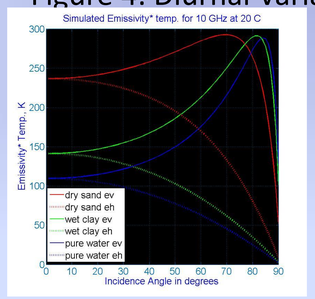



Figure 9: Surface Emissivity

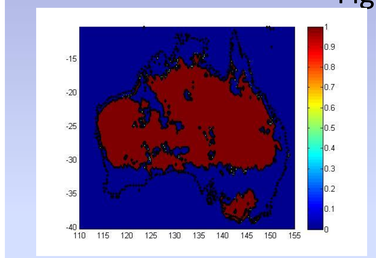


Figure 7: Preliminary Mask

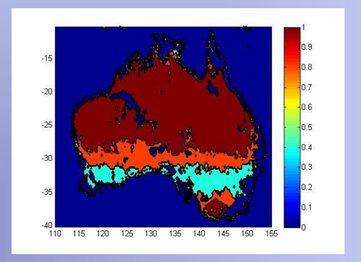


Figure 4: 10V Classification

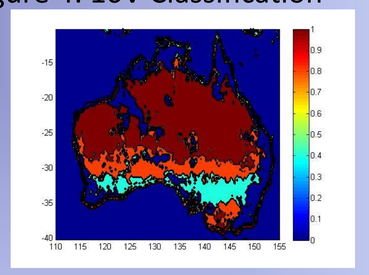


Figure 6: 10V Classification

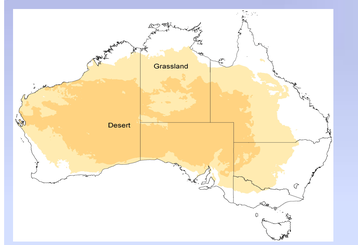



Figure 8: Grassland Vs. Desert

## Why SHOWMask ?

**Most warm scene calibration for microwave radiometers are performed over tropical rainforests. However these targets are often found to be inhomogeneous. Also the fractional coverage of tropical rainforests is receding.**

**On the other hand, global deserts has a bigger fractional coverage and will provide a more homogeneous scene for calibration.**

**Also, we can identify homogeneous desert scenes in subtropical areas also (figure 1), providing a better collocation probability while matching radiometers from polar orbiters.**

**Currently XCAL working group adopted a 2 point calibration ( cold and warm) for window channel radiometers. Providing an additional data point over the desert, will help understand the currently observed nonlinearity between cold and warm end calibration.**

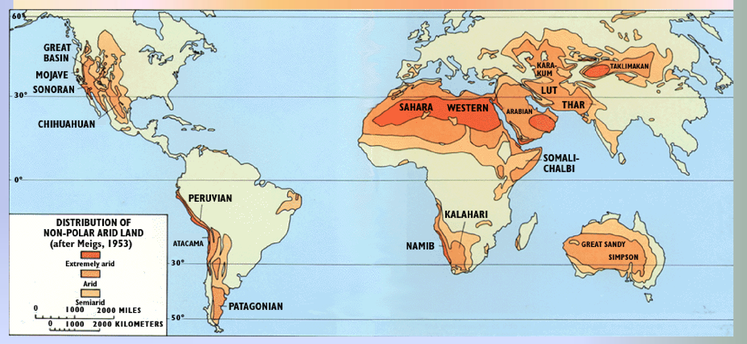



Figure 1: World Map of Deserts

## Next Steps

- **So far homogeneity is not exclusively considered in the algorithm yet. The next step is to average the temperature data over 0.5 degree and then 1 degree grid and see if we are getting similar diurnal pattern. Over arid desert regions the diurnal pattern should be spatially homogeneous.**
- **Utilize the SMAP data**
  - **Use soil moisture data to identify desert surface.**
  - **Use soil Temperature data to improve the surface emissivity estimate.**

**Acknowledgement:** This work is supported by NASA award # NNX16AE35G